

CLAIMS

What is claimed is:

1. A color shifting interference structure, comprising:
 - a first dielectric layer;
 - a first carbon layer overlying the first dielectric layer;
 - a second dielectric layer overlying the first carbon layer;
 - a second carbon layer overlying the second dielectric layer; and
 - a third dielectric layer overlying the second carbon layer;

wherein the dielectric layers have an optical thickness at a design wavelength that provides a color shift as the angle of incident light or viewing angle changes.

2. The interference structure of claim 1, wherein the dielectric layers each have an optical thickness from about 2 QWOT to about 9 QWOT at a design wavelength from about 400 nm to about 700 nm.

3. The interference structure of claim 1, wherein the first, second, and third dielectric layers have the same optical thickness.

4. The interference structure of claim 1, wherein the first, second, and third dielectric layers have an index of refraction from about 1.38 to about 2.3.

5. The interference structure of claim 1, wherein the first, second, and third dielectric layers comprise a material selected from the group consisting of silicon monoxide, silicon dioxide, and combinations thereof.

6. The interference structure of claim 1, wherein the first, second, and third dielectric layers are composed of the same material.

7. The interference structure of claim 1, wherein the first and third dielectric layers form a substantially continuous coating surrounding the first and second carbon layers.

8. The interference structure of claim 7, wherein the first and second carbon layers form a substantially continuous coating surrounding the second dielectric layer.

9. The interference structure of claim 1, wherein the interference structure is a foil.

10. The interference structure of claim 1, wherein the foil comprises a hot stamp foil.

11. The interference structure of claim 1, wherein the interference structure comprises a pigment flake.

12. A method of fabricating a color shifting interference structure, comprising:

forming a first dielectric layer over an upper surface of a web material;

forming a first carbon layer over the first dielectric layer;

forming a second dielectric layer over the first carbon layer to form an interference film; and

removing the interference film from the web material in order to produce a plurality of multilayer interference flakes or foils.

13. The method of claim 12, further comprising forming a second carbon layer over the second dielectric layer, and forming a third dielectric layer over the second carbon layer prior to removing the interference film from the web material.

14. The method of claim 12, further comprising mixing the interference flakes with a pigment medium.

15. The method of claim 12, further comprising coating the interference flakes with a second carbon layer that substantially surrounds both of the first and second dielectric layers.

16. The method of claim 12, further comprising coating the interference flakes with a third dielectric layer that substantially surrounds both of the first and second dielectric layers, wherein the third dielectric layer has a refractive index that is different from the refractive index of the first and second dielectric layers.